

REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of September 21, 2007 is respectfully requested.

The Examiner's Action

In section 2 on page 2 of the Office Action, the Examiner rejected claims 1-8 and 12-20 as being anticipated by Mathieus. Further, in section 4 on page 3 of the Office Action, claims 9-11 were rejected as being unpatentable over Mathieus.

However, it is respectfully submitted that the present invention, as particularly now set forth in new claims 21-40, clearly patentably distinguishes over Mathieus.

Amendments

It is initially noted that a number of minor formal changes have been made to the specification and abstract for the sake of form. No new matter has been entered.

Furthermore, original claims 1-20 have now been canceled and replaced with new claims 21-40. Independent claim 21 is an apparatus claim reciting a high pressure water jet surface cutting device, and claims 22-29 are dependent claims corresponding generally to the prior dependent claims.

Independent claim 30 is a method claim corresponding to claim 21. While method claims were previously presented in dependent form, it is respectfully submitted that restriction is not proper under the present circumstances in view of the close correspondence between the language that is employed in method claim 30 and apparatus claim 21. Further note the correspondence between the respective dependent claims.

Accordingly, examination of all of new claims 21-40 is respectfully submitted to be appropriate at this point in the prosecution.

The Present Invention

As described in the specification and as now reflected in the claims, the present invention is directed to a method and device for cutting a resin matrix portion and a surface of a composite molded article that includes an irregular surface having a height from a foundation layer surface within a range of 1 to 100 mm. Note for example Fig. 1, showing such a surface. A composite molded article may include surface features, design, decoration, etc. Typically as well, there may be a resin matrix portion, consisting of inorganic particles and a resin, that is required to be removed. In the prior art, the use of a high pressure water jet could remove such a resin matrix. However, with prior art devices, cutting off the resin matrix at a vertex portion 11 and a flat portion 12 could be satisfactorily performed, but cutting at an inclined portion 13 would not be sufficient if the vertex portion 11 and flat portion 12 were satisfactory.

Accordingly, the present invention provides a high pressure water jet surface cutting device that enables the cutting of the resin matrix portion on the surface of the composite molded article, which includes an irregular surface, satisfactorily at each of the vertex portion 11, flat portion 12 and inclined portion 13.

A high pressure water jet nozzle head is movable in X and Y directions while being rotated about an axis of rotation. A plurality of high pressure water jet nozzles 3 are arranged on the nozzle head so that high pressure water jet centers of nozzles are directed at inclined angles with respect to the axis of rotation so that the high pressure water jet centers of the nozzles will be directed at the inclined angle with respect to the foundation layer surface of the composite molded article while cutting the resin matrix portion. Note for example Fig. 3 as well as Fig. 2.

The plurality of high pressure water jet nozzles are positioned on the nozzle head so that the jet centers of the nozzles are directed at the inclined angle so that cutting of the resin matrix portion with the high pressure water jet from the nozzles, while moving the high pressure water jet nozzle head in the X and Y directions and rotating the high pressure water jet nozzle head about the axis of rotation, results in areas, formed by loci of the jet centers with respect to the foundation layer surface against which the high pressure water is jetted and strikes, are uniform.

The above described invention is reflected in independent claim 21 in the form of the device and in independent claim 30 in the form of a method.

The invention is further emphasized for example by dependent claim 32, which recites that the plurality of high pressure water jet nozzles are arranged on the nozzle head so as to include high pressure water jet centers that are inclined in a direction away from the axis of rotation as well as high pressure water jet centers that are inclined toward the axis of rotation. This is further emphasized by dependent claim 33. Note for example Fig. 3. Note also corresponding dependent claims 23 and 24.

The above features clearly define over Mathieus, as will be discussed below.

Mathieus

Mathieus is directed to a method for cleaning a surface using rotating high pressure fluid streams. As can be seen for example from Fig. 4, jets 49 are spaced about axis A and are all directed outwardly with respect to the axis. Mathieus is not directed toward a device that is used to cut a resin matrix portion on a surface of a composite molded article as recited in independent apparatus claim 21 and independent method claim 30. In particular, with the present invention the high pressure water jet nozzles are positioned in the nozzle head so that, during movement of the high pressure water jet nozzle head in the X and Y directions, while rotating the high pressure water jet nozzle head about the axis of rotation, areas that are formed by loci of the jet centers, with respect to the foundation layer surface against which the high pressure water is jetted and strikes, are uniform. There is no such disclosure of the creation of uniform areas for cutting a resin matrix portion on a surface of a composite molded article that includes an irregular surface having a height from a foundation layer surface within a range of 1 to 100 mm disclosed or suggested in Mathieus.

Further, while Mathieus has nozzles that are generally directed outwardly with respect to the axis of rotation, there are none that are directed inwardly or toward the axis of rotation as required by claims 23 and 32. Nor would this feature be obvious. Nor would the features of claims 24 and 33 then be obvious.

If a conventional nozzle head, having as many nozzles as those according to the present invention, is employed, and it is set such that a predetermined matrix surface layer can be cut at the flat portion, then the matrix surface layer at the inclined portion would hardly be cut. However, if the setting is made such that the water jet pressure is higher, and/or the distance between each nozzle and the molded article is shorter so that the inclined portion of the composite molded article is adequately cut, then the flat portion becomes excessively cut.

Accordingly to the present invention, this is resolved by the positioning of the high pressure water jet nozzles with respect to the nozzle head, as is recited in each of independent claims 21 and 30. No such positioning is achieved in Mathieus. As such, it is respectfully submitted to be clear that all of the claims clearly define over Mathieus.

However, it must further be noted that many of the features that are specifically identified in the respective dependent claims even further distinguish over Mathieus, as for example discussed above with respect to claims 23 and 24, and claims 32 and 33.

In rejecting claims 9-11, the Examiner takes the position that the application has not disclosed that the cutting of the composite molded article with the claimed device provides an advantage, or is used for a particular purpose, or solves a stated problem. However, this is respectfully submitted to be incorrect, for the reasons as discussed above with respect to the problems involved in the cutting of the resin matrix portion on inclined surfaces. Thus the Examiner's conclusion that one of ordinary skill in the art would have expected Applicants' method of cutting to perform equally well with either the claim device or the Mathieus device is also incorrect. Nor is this a matter of an obvious design choice.

It is noted in particular that the Examiner has not specifically addressed the prior claim features, now also claimed in claims 23 and 24 and claims 32 and 33, e.g., where an inclination toward the axis of rotation is specifically required. There is no reason to make any such modification of Mathieus raised in Mathieus, and thus these claims are further not obvious from Mathieus.

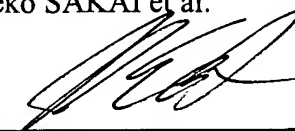
Conclusion

In view of the above it is respectfully submitted that all of the claims which are now pending in the present application clearly define over Mathieus. Indication of such, as well as allowance of the application as a whole is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

Mieko SAKAI et al.

By: 

Nils E. Pedersen
Registration No. 33,145
Attorney for Applicants

NEP/krp
Washington, D.C. 20006-1021
Telephone (202) 721-8200
Facsimile (202) 721-8250
December 21, 2007